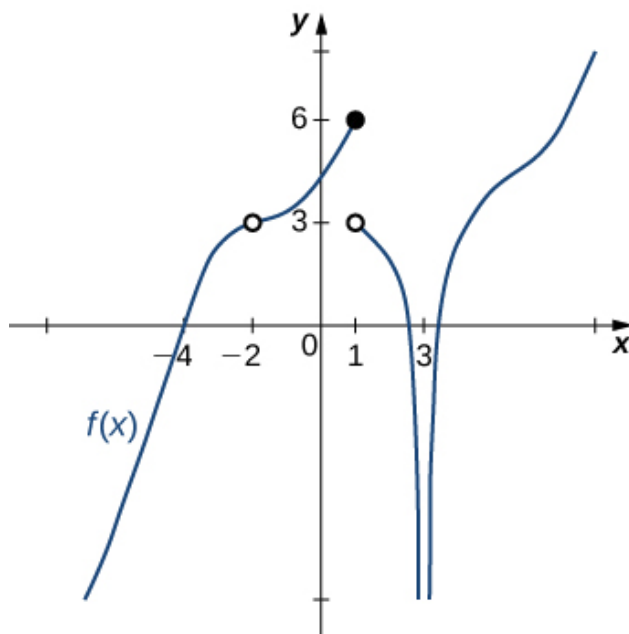


This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

If you have a suggestion to make the keys better, please fill out the short survey [here](#).

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

1. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \rightarrow a} f(x) = 3$.



The solution is Multiple a make the statement true., which is option D.

- A. -2
- B. 1
- C. $-\infty$
- D. Multiple a make the statement true.
- E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

2. Evaluate the limit below, if possible.

$$\lim_{x \rightarrow 9} \frac{\sqrt{7x - 14} - 7}{2x - 18}$$

The solution is None of the above, which is option E.

- A. 1.323

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

B. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

C. 0.036

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

D. 0.071

You likely memorized how to solve the similar homework problem and used the same formula here.

E. None of the above

* This is the correct option as the limit is 0.250.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 9$.

3. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \rightarrow 1^+} \frac{1}{(x-1)^8} + 4$$

The solution is ∞ , which is option C.

A. $-\infty$

B. $f(1)$

C. ∞

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

4. To estimate the one-sided limit of the function below as x approaches 8 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{8}{x} - 1}{x - 8}$$

The solution is $\{7.9000, 7.9900, 7.9990, 7.9999\}$, which is option C.

A. $\{7.9000, 7.9900, 8.0100, 8.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

B. $\{8.1000, 8.0100, 8.0010, 8.0001\}$

These values would estimate the limit of 8 on the right.

C. $\{7.9000, 7.9900, 7.9990, 7.9999\}$

This is correct!

D. $\{8.0000, 7.9000, 7.9900, 7.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 8 doesn't help us estimate the limit.

E. $\{8.0000, 8.1000, 8.0100, 8.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 8 doesn't help us estimate the limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

5. Based on the information below, which of the following statements is always true?

As x approaches 9, $f(x)$ approaches 7.206.

The solution is $f(x)$ is close to or exactly 7.206 when x is close to 9, which is option D.

- A. $f(x) = 9$ when x is close to 7.206
- B. $f(x) = 7.206$ when x is close to 9
- C. $f(x)$ is close to or exactly 9 when x is close to 7.206
- D. $f(x)$ is close to or exactly 7.206 when x is close to 9
- E. None of the above are always true.

General Comment: The limit tells you what happens as the x -values approach 9. It says **absolutely nothing** about what is happening exactly at $f(9)$!

6. Based on the information below, which of the following statements is always true?

As x approaches 9, $f(x)$ approaches 8.194.

The solution is None of the above are always true., which is option E.

- A. $f(8)$ is close to or exactly 9
- B. $f(9)$ is close to or exactly 8
- C. $f(9) = 8$
- D. $f(8) = 9$
- E. None of the above are always true.

General Comment: The limit tells you what happens as the x -values approach 9. It says **absolutely nothing** about what is happening exactly at $f(9)$!

7. To estimate the one-sided limit of the function below as x approaches 3 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{3}{x} - 1}{x - 3}$$

The solution is $\{2.9000, 2.9900, 2.9990, 2.9999\}$, which is option E.

- A. $\{2.9000, 2.9900, 3.0100, 3.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

- B. $\{3.0000, 2.9000, 2.9900, 2.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 doesn't help us estimate the limit.

C. $\{3.1000, 3.0100, 3.0010, 3.0001\}$

These values would estimate the limit of 3 on the right.

D. $\{3.0000, 3.1000, 3.0100, 3.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 doesn't help us estimate the limit.

E. $\{2.9000, 2.9900, 2.9990, 2.9999\}$

This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

8. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \rightarrow -1^-} \frac{8}{(x+1)^5} + 1$$

The solution is $-\infty$, which is option C.

A. ∞

B. $f(-1)$

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

9. Evaluate the limit below, if possible.

$$\lim_{x \rightarrow 8} \frac{\sqrt{3x-8}-4}{6x-48}$$

The solution is None of the above, which is option E.

A. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

B. 0.021

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

C. 0.289

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

D. 0.125

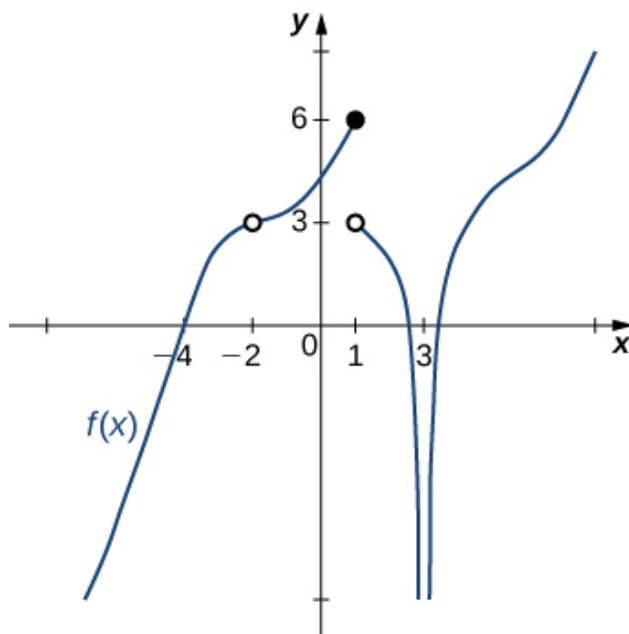
You likely memorized how to solve the similar homework problem and used the same formula here.

E. None of the above

* This is the correct option as the limit is 0.062.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 8$.

10. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \rightarrow a} f(x) = 0$.



The solution is Multiple a make the statement true., which is option D.

- A. 3
- B. -4
- C. 0
- D. Multiple a make the statement true.
- E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.
